

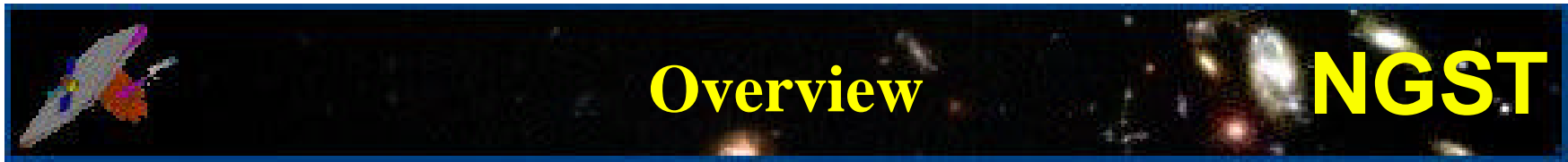
NGST Technology Development & Test Flight Program

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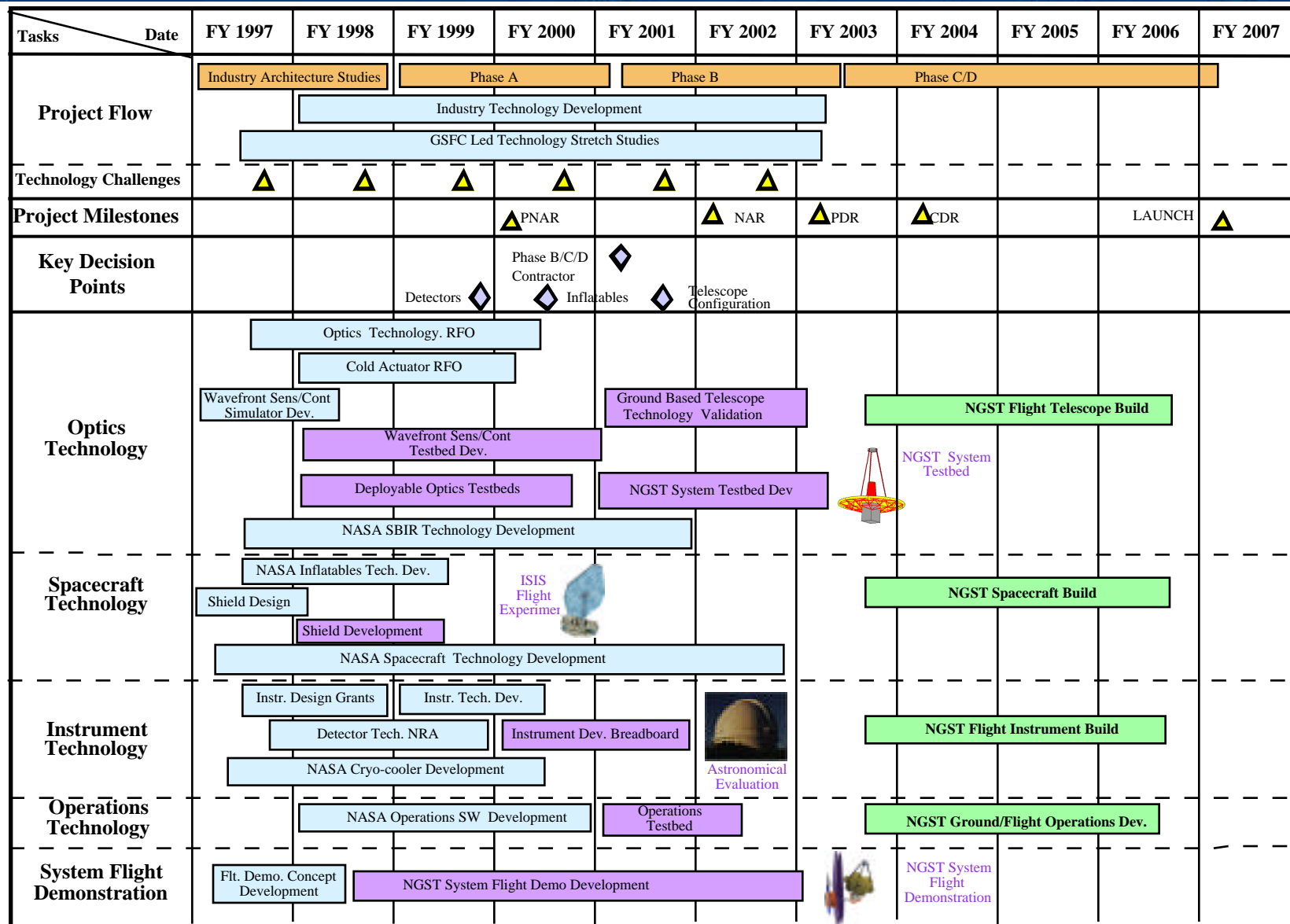
- **The technology challenge for NGST is to provide 10 times the collecting area, 1/5 the mass and 1/8 the life cycle cost (compared to HST)**
- **Ideal scientific characteristics for NGST: aperture $> 4\text{m}$, $0.5\text{-}20\ \mu\text{m}$, radiatively cooled telescope, large area, high sensitivity detectors, minimize zodiacal light problem, efficient wide field cameras and spectrometers (with constrained cost)**
- **Several mission concepts have been proposed that meet science and cost challenges, none of which appear to require significant new inventions, but rely on reasonable extensions of existing technology**
- **Test flights of critical technology are considered essential to demonstrate technical and programmatic (cost, schedule) readiness to do NGST (phase C/D/E)**

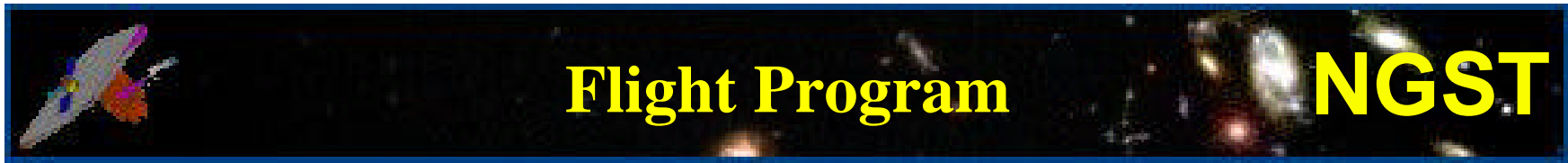


- **A preliminary technology development roadmap has been developed to look at innovative architecture concepts, technology refinements, and demonstration of mission enabling technology which are essential to establishing mission readiness**
- **There is a government led portion of the technology development and an industry led portion**
- **The government led portion will aggressively push development of enabling technologies that are not tied to a particular concept, but represent a set of technologies that support a wide range of architectures**
- **The industry led portion may focus more on critical elements of individual concepts**
- **In addition to providing the metrics to establish technology readiness, these activities, testbeds and flight experiments will demonstrate that NGST can be completed for a reasonable cost**

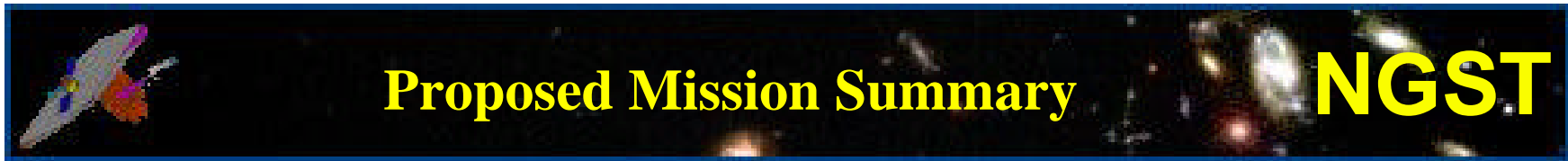
NGST Technology Development Roadmap

NGST





- **A flight program has been part of risk reduction strategy and is described in the “Breckenridge” meeting to justify and control projected cost of NGST**
- **The cost of a simple space mission is substantial, and must provide significant results that are not available through ground testbeds and testing**
- **The NGST mission study team is looking at flight testing on a subsystem and system level**
- **NGST initially proposed three ‘Pathfinder’ experiments to address subsystem and system level issues**
- **Experiment definition, technology selection and management structure has not been completed**



Proposed Mission Summary **NGST**

	Pathfinder 1 ** ISIS	Pathfinder 2 ** NGST Technology	Pathfinder 3 NEXUS
Technology	Sunshield technology	Component/subsystem technology from industry	OTA, WFS, SW, isolation system, Science Instrument Technology
Flight Date	2000	2000	June 2003
Mission Type	Shuttle Freeflyer/Hitchhiker	Shuttle Hitchhiker	Shuttle Freeflyer or secondary payload
Mission Requirements	Orbit Altitude: None Inclination: None Duration: 4-6 days	Orbit Altitude: None Inclination: None Duration: 4-6 days	Orbit Altitude: High Inclination: High Duration: ~ 6 months

**** Pathfinder 1 & 2 will be combined in a single flight in FY2000**

- **NASA HQ, Code S has approved the NGST project request for flight assignment on two Shuttle missions in 2000 and 2003**



- **NGST Study team is working with JPL Inflatable Technology program to develop a prototype sunshield (inflatable struts, gas inflation system and membrane material) that meets NGST requirements**
- **This prototype sunshield will be flown to demonstrate controlled deployment and data will be collected on structural performance**
- **Additional topics being studied under technology development and flight program:**
 - **Membrane materials: coatings, lifetime requirements, packaging, manufacturing processes**
 - **Structural and thermal requirements**
 - **Contamination mechanism and mitigation**
 - **Modeling sunshield behavior**



- **Technology roadmaps from Architecture Studies Teams may call for flight demonstration of component or subsystem technology to establish technology readiness**
- **NASA technology development teams may want to fly selected elements**
- **NGST has a platform (Shuttle/Hitchhiker) available in June 2000 and can provide opportunity for a short duration, LEO flight test**
- **Payload complement is TBD at this time**



- **NGST is a complex system with multiple optical, electrical, structural, thermal and control systems operating in a highly integrated environment**
- **NEXUS will be the first experiment that demonstrates key NGST system technologies, operational methods as an integrated system, validates the engineering analysis and modeling and exercises the management and engineering partnership that must work together to build NGST**
- **NEXUS will demonstrate our ability to design, build, and operate a new space mission on cost and schedule, using the management and engineering processes developed for NGST and is the milestone that will allow the project to proceed to Phase C/D**

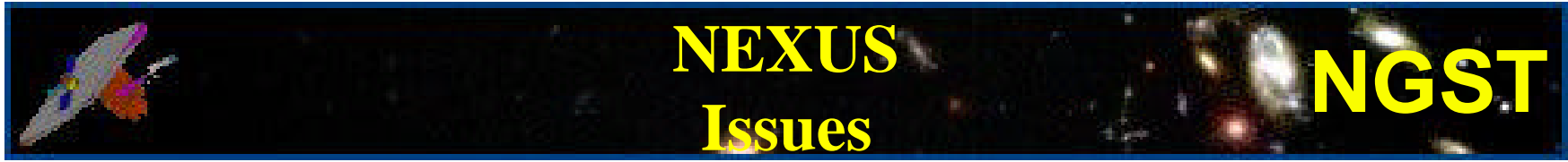
A banner with a dark space background featuring a satellite on the left and distant galaxies on the right. The text "NEXUS" and "NGST" are in large yellow font, with "Experiment Description" in a smaller yellow font below them.

NEXUS

NGST

Experiment Description

- **Prior to the end of Phase B, use the flight design of the prime contractor, to demonstrate integrated technology**
- **NEXUS will consist of a scaled version of the flight adaptive telescope assembly, together with active optical wavefront sensing, guiding, pointing and imaging capabilities**
- **Performance of critical technology such as lightweight cryogenic actuators, adaptive optics, active wavefront sensing and control hardware, vibration isolation structures, with real time autonomous software control will be demonstrated in an integrated system**
- **During the six month mission, the experiment will duplicate the planned deployment, optical alignment and phasing, calibration and cryogenic operation of the system**



- **Technically challenging flight mission under strict schedule and financial constraints**
- **Stakeholders in NGST; science community, government and industry, must develop a mission that provides framework for industry to demonstrate the critical NGST technology at the exact moment that it is ready**

NEXUS Optimal Schedule

NGST

